CLAIMS:

1. A seal assembly for a turbomachine, the turbomachine comprising a stationary housing and a plurality of blades mounted for rotation about an axis, the seal assembly comprising:

a substantially wear-resistant surface disposed as the tip of the seal assembly, the substantially wear-resistant surface being positioned physically proximate to tips of the plurality of blades; and

a biasing member disposed intermediate to the substantially wear-resistant surface and the stationary housing, wherein the wear resistant surface is biased towards the tips of the plurality of blades.

2. The seal assembly of claim 1, wherein the stationary housing is a casing of a compressor stage or a static shroud assembly of a turbine stage.

3. The seal assembly of claim 1, wherein the substantially wear-resistant surface comprises a hard ceramic material.

4. The seal assembly of claim 1, wherein the substantially wear-resistant surface comprises a hard metallic material.

5. The seal assembly of claim 1, wherein the substantially wear-resistant surface comprises a hard cermet material.

6. The seal assembly of claim 1, wherein the biasing member comprises a plurality of spring plungers, each spring plunger further comprising:

an enclosure;

an biasing element disposed within the enclosure; and

a protruding button disposed on the substantially wear-resistant surface.

7. The seal assembly of claim 6, wherein the biasing element comprises a plurality of spring washers.

8. The seal assembly of claim 6, wherein the biasing element comprises a high temperature resistant and creep resistant metal alloy.

9. The seal assembly of claim 6, further comprising:

a backing supporting the spring plungers;

a skirt disposed on the backing, the skirt having a box shape, wherein the skirt is open at a bottom thereof; and

a secondary sealing element disposed at an interface of the skirt and the backing.

10. The seal assembly of claim 1, wherein the biasing member includes an biasing element comprising at least one wave of a wave spring disposed intermediate the stationary housing and the substantially wear-resistant surface.

11. The seal assembly of claim 10, wherein the wave spring comprises a high temperature resistant and creep resistant metal alloy.

12. The seal assembly of claim 10, further comprising an enclosure positioned intermediate the substantially wear-resistant surface and the stationary housing, the enclosure further comprising an upper half and a lower half, wherein the wave spring is disposed intermediate to the upper half and the lower half of the enclosure.

13. The seal assembly of claim 12, wherein the upper half of the enclosure slides into the lower half of the enclosure at edges thereof.

14. The seal assembly of claim 13, further comprising a bellows at the edges of the upper half and the lower half of the enclosure.

15. The seal assembly of claim 13, further comprising a secondary sealing element disposed at an interface of the upper half and the lower half of the enclosure.

16. A method of sealing a gas path between a stationary housing of a turbomachine and a rotating element mounted on an axis of the turbomachine, the method comprising:

engaging a substantially wear-resistant surface against a tip of the rotating element;

disposing a biasing member intermediate to the substantially wear-resistant surface and the stationary housing; and

urging the substantially wear-resistant surface toward the rotating element via the biasing member.

17. The method of claim 16, wherein the biasing member includes a plurality of spring plungers, wherein each spring plunger comprises an enclosure, an biasing element disposed within the enclosure and a protruding button disposed toward the substantially wear-resistant surface.

18. The method of claim 17, wherein the biasing element includes a plurality of spring washers in stacked arrangement.

19. The method of claim 18, further comprising:

disposing a backing within the enclosure to support the spring plungers;

disposing a skirt on top of the backing and having the shape of a box open at the bottom; and

disposing a secondary seal at an interface of the skirt and the backing to seal gas passage between the skirt and the backing.

20. The method of claim 16, wherein the biasing member includes at least one wave spring disposed intermediate to the substantially wear-resistant surface and the stationary housing.

21. The method of claim 20, further comprising:

disposing an enclosure intermediate to the substantially wear-resistant surface and the stationary housing, the enclosure comprising an upper half and a lower half; and

disposing the wave spring intermediate to the upper half and the lower half of the enclosure.

22. The method of claim 21, further comprising welding edges of the lower half of the enclosure to edges of the upper half to form a bellows and to seal a gas passage between the upper half and the lower half of the enclosure.

23. The method of claim 22, wherein an inner and an outer bellows-like structure containing slits form the flexible edge seal.

24. The method of claim 21, further comprising disposing a secondary seal at an interface between the upper half of the enclosure and the lower half thereof to seal a gas passage therebetween.

25. A turbine comprising:

a rotor assembly comprising a plurality of blades mounted for rotation about an axis;

a shroud assembly surrounding the plurality of blades; and

a compliant seal assembly disposed intermediate to the tips of the plurality of blades and the stationary shroud assembly, the compliant seal assembly further comprising:

a substantially wear-resistant surface positioned physically proximate to the blade tips; and

a biasing member disposed intermediate to the substantially wear-resistant surface and the stationary shroud assembly to bias the substantially wear-resistant surface against the tips of the plurality of blades.

26. The turbine of claim 25, wherein the substantially wear-resistant surface comprises a ceramic material.

27. The turbine of claim 25, wherein the biasing member comprises a plurality of spring plungers, each spring plunger further comprising an enclosure, an biasing element disposed within the enclosure, and a protruding button disposed towards the substantially wear-resistant surface.

28. The turbine of claim 27, wherein the biasing element comprises a plurality of spring washers disposed in a stacked arrangement.

29. The turbine of claim 27, wherein the compliant seal assembly further comprises a backing supporting the spring plungers, a skirt disposed on top of the backing and having a box shape open at the bottom, and a secondary sealing element disposed at an interface of the skirt and the backing.

30. The turbine of claim 25, wherein the biasing member includes an biasing element comprising at least one wave of a wave spring disposed intermediate to the stationary shroud assembly and the substantially wear-resistant surface.

31. The turbine claim 30, wherein the compliant seal assembly further comprises an enclosure positioned intermediate to the substantially wear-resistant surface and the stationary shroud assembly, the enclosure further comprising an upper half and a lower half, wherein the wave spring is disposed intermediate to the upper half and the lower half of the enclosure.

32. The turbine of claim 31, wherein upper half and the lower half of the enclosure form a bellows.

33. The turbine of claim 31, wherein the compliant seal assembly further comprises a secondary sealing element disposed at an interface of the upper half and the lower half of the enclosure.

34. A turbine comprising:

a rotor assembly comprising a plurality of blades mounted for rotation about an axis, each blade comprising a partial shroud at tips thereof, wherein the partial shrouds at the tips of the plurality of blades are adjacently positioned to form a substantially continuous rotating inner ring;

a stationary shroud assembly forming a static outer ring surrounding the rotating inner ring; and

a compliant seal assembly disposed intermediate to the rotating inner ring and the static outer ring, the seal assembly comprising a substantially wear-resistant surface positioned proximate to the rotating inner ring; and a biasing member disposed intermediate to the substantially wear-resistant surface and the stationary shroud assembly to bias the substantially wear-resistant surface against the rotating inner ring.

35. The turbine of claim 34, wherein an outer periphery of the rotating inner ring comprises a plurality of knife-edges directed radially outwards, an inner periphery of the static outer ring comprises a plurality of knife edges directed radially inwards, and wherein the knife edges on the inner ring are alternately arranged with the knife edges on the outer ring, forming a labyrinth structure.

36. The turbine of claim 35, wherein the compliant seal assembly is disposed intermediate to two consecutive knife-edges on the inner periphery of the static outer ring.

37. The turbine of claim 36, wherein the substantially wear-resistant surface comprises a ceramic material.

38. The turbine of claim 36, wherein the biasing member comprises a plurality of spring plungers, each spring plunger comprising an enclosure, an biasing element disposed within the enclosure, and a protruding button disposed toward the substantially wear-resistant surface.

39. The turbine of claim 38, wherein the biasing element comprises a plurality of spring washers disposed on top of each other.

40. The turbine of claim 38, wherein the compliant seal assembly further comprises a backing supporting the spring plungers, a skirt disposed on top of the backing and having a box shape open at the bottom, and a secondary sealing element disposed at an interface of the skirt and the backing.

41. The turbine of claim 36, wherein the biasing member includes an biasing element comprising at least one wave of a wave spring disposed intermediate to the stationary shroud assembly and the substantially wear-resistant surface.

42. The turbine claim 41, wherein the compliant seal assembly further comprises an enclosure positioned intermediate to the substantially wear-resistant surface and the stationary shroud assembly, the enclosure further comprising an upper half and a lower half, wherein the wave spring is disposed intermediate to the upper half and the lower half of the enclosure.

43. The turbine of claim 42, wherein upper half and the lower half of the enclosure form a bellows.

44. The turbine of claim 42, wherein the compliant seal assembly further comprises a secondary sealing element disposed at an interface of the upper half and the lower half of the enclosure.